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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/804,158	03/13/2001	Susumu Kawada	57454-037	8619

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EXAMINER

ROSASCO, STEPHEN D

ART UNIT PAPER NUMBER

1756

DATE MAILED: 11/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/804,158

Applicant(s)

KAWADA ET AL.

Examiner

Stephen Rosasco

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 15-62 and 66-74 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-7, 15-17, 19-40, 42-47, 49-62 and 66-74 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/07/05</u> | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

In response to the Remarks of 10/06/05, the examiner indicates allowability of claims 4, 18, 41 and 48, repeats the prior office action rejection over the claims as previously listed and makes the action final.

Remarks – The applicant has argued that the examiner has failed to make out a prima facie case of obviousness, because he has not provided an objective teaching in the art that would have motivated a skilled artisan to combine the references as contended in the Office Action to yield the claimed invention. And that the Examiner simply states that it was "well known" to make layers similar to the claimed layer by long throw sputtering, but does not provide any support for this statement, either within or without the cited references. Without some show of support, the Examiner's statement is simply speculative, and cannot support an obviousness rejection.

However, the use of sputtering to make phase shifting layers is well known. The cited prior art to Hu and Chang et al. teach the long throw sputtering technique for making similar layers on substrates. These layers would be capable of phase shifting light.

The applicant also states that the claimed invention would not have been obvious in view of the cited references because the inventive process step (i.e., the step of forming a phase shifter film using a reactive long throw sputtering process) yields unexpected results, which are not taught or suggested by the references of the prior art. Specifically, the claimed phase shift mask and process results in high transmittance in certain exposure light wavelengths. Moreover, the present invention results in a low-defect mask, due to making the inventive film using a long

However, the advantages of the technique are known as described by Chang et al. in the rejection below. And the invention as claimed does not indicate that at certain wavelengths transmission would ordinarily not be expected or that a certain defect level was improved on. The technique is known and it would be expected that if similar materials are used than similar results would be obtained.

The applicant is claiming the use of a known method of sputtering, for use in making phase shifting masks. However, the technique is well known to make similar layers in other devices. And is a modification of the conventional sputtering technique that is well known to make the claimed mask layers. The preamble language is not given as much weight as the body of the claims and the "intended use" language in the preamble is given essentially no weight at all. The examiner has made a rejection under

35 U.S.C. 103(a) and maintains that the long throw technique is a modified sputtering technique and does not rise to the level of a different technique that one in the art would not expect to be familiar with.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action.

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In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-7, 15-17, 19-40, 42-47, 49-62, 66-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsui et al. (5,942,356) in view of Hu (5,725,739) or Chang et al. (6,458,255).

The claimed invention is directed to a phase shifter film used for making a phase shift mask, and also to the mask, blank, method of making both and method of using the mask: characterized in that said phase shifter film is a film formed by using a reactive long throw sputtering device.

And wherein said phase shifter film is made of a molybdenum silicide oxide nitride.

Mitsui et al. teach a method for manufacturing a phase shift mask blank comprising steps of preparing a substrate, transparent to an exposure light beam, and a target containing silicon, and metal therein, wherein a mol % ratio of metal to silicon is higher than a stoichiometrically stable composition ratio of 33 relative to 67;

locating the substrate and the target within an atmosphere containing nitrogen; and sputtering the target to deposit onto the substrate a translucent phase shift film which comprises the metal, the nitrogen and the silicon.

The teachings of Mitsui et al. differ from those of the applicant in that the applicant teaches the use of the long throw sputtering technique.

Hu teaches (see claims 1-18) a method for depositing a material, comprising an alloy or a composite, into a recess, having an upper and lower surface, the method comprising the steps of: sputtering from a target, comprised of the material, onto the upper surface to form a layer of deposited material.

And wherein the target is comprised of an alloy or composite material, selected from the group consisting of: refractory metal silicides, magnet alloys, alloys used in micromachining manufacturing processes, and silicide composites.

And wherein the target is comprised of titanium silicide, having a ratio of silicon to titanium between approximately 2.0:1 and 2.7:1.

And further comprising the step of annealing the titanium-rich titanium silicide to reduce native oxides and form a low resistivity contact.

And wherein the sputtering and resputtering steps comprise utilizing a noncollimated, long-throw physical vapor deposition sputtering apparatus, with a substrate-to-target distance of approximately between 100 to 1,000 millimeters.

Chang et al. teach a method of producing a sputtered $\text{Ta}_{\text{sub.x}}\text{N}_{\text{sub.y}}$ film having a resistivity of less than $25 \mu\Omega\cdot\text{cm}$, wherein x is 1 and y ranges from about 0.05 to about 0.18, said method comprising: placing a substrate on a temperature-controlled support platen in a physical vapor deposition process chamber; and controlling a

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temperature of said support platen during sputtering of said Ta.sub.x N.sub.y film upon said substrate, wherein said substrate temperature is about 165.degree. C. or higher during deposition of said sputtered Ta.sub.x N.sub.y film, and wherein said sputter deposition is high density plasma sputter deposition, and a surface of said Ta.sub.x N.sub.y film is ion bombarded during said deposition.

Chang et al. also teach (see esp. cols. 7, 8) :

The term "long-throw sputter deposition" refer to a sputter deposition technique which utilizes conventional, non-collimated magnetron sputtering at low pressures, where the distance between the target and the substrate is equal to or greater than the diameter of the substrate. Long-throw (gamma) sputter deposition enables control of the degree of directionality in the deposition of film layers, resulting in improved step coverage as compared with conventional magnetron sputtering.

FIG. 4 is a graph showing the resistivity of a sputter-deposited Ta.sub.x N.sub.y film (deposited using long-throw or high density plasma techniques) as a function of the substrate platen heater temperature during deposition of the film, wherein x is 1 and y ranges from about 0.05 to about 0.18.

It would have been obvious to one having ordinary skill in the art to take the teachings of Mitsui et al. and combine them with the teachings of Hu or Chang et al. in order to make the claimed invention because the advantages for using the technique of long throw sputtering for making layers on substrates similar to those in the mask art were well known, and therefore, one in the art would know to employ the technique when making mask layers.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized, sweeping flourish at the end.

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
10/25/05